Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_

Separation of Mixtures Lab

**Introduction:**

Mixtures are not unique to chemistry; we use and consume them on a daily basis. The beverages we drink each morning, the fuel we use in our automobiles, and the ground we walk on are mixtures. Very few materials we encounter are pure. Any material made up of two or more substances that are not chemically combined is a mixture.

The ability to separate and recover pure substances from mixtures is extremely important in scientific research and industry. Chemists need to work with pure substances, but naturally occurring materials are seldom pure. Often, differences in the physical properties of the components in a mixture provide the means for separating them. In this experiment, you will have an opportunity to design, develop and implement your own procedure for separating a mixture. The mixture you will work with contains salt, sand, iron filings, and pebbles.

**Purpose:**

The purpose of this lab is to isolate each of the five substances in the mixture and determine the percent composition by mass of the mixture.

**Materials:**

Every group will have the following:

* Mixture
* Iron filings
* Sample of salt
* Sample of sand
* Sample of pebbles
* Watch glass
* 2 beakers

Additional Materials Available:

* Erlenmeyer flask
* Funnel
* Filter paper
* Scoopula
* Pipettes
* Tweezers
* Test tubes
* Tongs
* Water
* Magnet
* Paper towel
* Hot plate

**Procedure:**

* Using any of the materials above, work with your group to write your own procedure for separating the mixture.
* Try to separate the mixture in as few steps as possible.
* If water is part of your procedure, be careful not to use too much!
* Write the procedure in your notebook. It should be written clearly and thoroughly enough so that anyone not familiar with the lab could reproduce your results simply by reading and following your procedure.

**Data and Observations:**

* Make sure to record the original mass of your mixture.
* For each component of the mixture, describe how you separated it and whether or not it worked. Explain exactly why it did or did not work.
* Once you have separated your mixture into its components, measure the mass of each individual substance.

**Data:**

1. Original mass of mixture: \_\_\_\_\_\_\_\_\_ grams
2. Final masses
   1. Mass of iron: \_\_\_\_\_\_\_\_\_ grams
   2. Mass of sand: \_\_\_\_\_\_\_\_\_ grams
   3. Mass of salt: \_\_\_\_\_\_\_\_\_ grams
   4. Mass of pebbles: \_\_\_\_\_\_\_\_\_ grams
   5. Total: \_\_\_\_\_\_\_\_\_ grams

**Observations**

|  |  |  |  |
| --- | --- | --- | --- |
|  | *Separation Method (Be specific.)* | *Physical Property that Allowed you to Separate:* | *Results (Did it work? Explain exactly why or why not.)* |
| Salt |  |  |  |
| Sand |  |  |  |
| Iron filings |  |  |  |
| Pebbles |  |  |  |

**Separation of Mixtures Lab Reflection**

Write a reflection in complete sentences that answers the following questions:

* What was the purpose of the lab?
* What are physical properties?
* How did you separate each part of the mixture? Include which physical properties you used to separate the ingredient from the mixture.
* How did the final mass of your mixture compare to the original mass? Explain why these masses are not the same (this is where you talk about sources of error).
* What would you do differently if you could separate the mixture again? This part should be at least 3 sentences.

**Analysis Questions:**

Answer in complete sentences in your notebook or on a separate piece of paper.

1. In your notebook, calculate the percent composition by mass of your mixture. *For example, if your total mixture had a mass of 100g and the isolated salt had a mass of 9g, then the mixture would be 9% salt.*
2. Do all of your calculations add up to exactly 100%? If not, explain why that might be. Consider how the mass of each individual substance may have been altered throughout the lab.
3. Name one heterogeneous mixture present in this lab.
4. Name one homogenous mixture present in this lab.

**Data and Observations: Mixture**

|  |  |  |
| --- | --- | --- |
|  | *Separation Method (Be specific.)* | *Results (Did it work? Explain exactly why or why not.)* |
| Salt |  |  |
| Black pepper |  |  |
| Sand |  |  |
| Iron filings |  |  |
| Pebbles |  |  |

**Results and Analysis:**

On a separate sheet of your notebook, in short, concise, numbered steps, write out the procedure you followed. It should be written clearly and thoroughly enough so that anyone not familiar with the lab could reproduce your results simply by reading and following your procedure.

**Conclusion:**

Answer the following questions on the next blank page of your notebook.

1. What made you decide to do your procedural steps in the order that you did?
2. Would any order have worked? Why or why not?
3. In your estimation, how successful were you (on a scale of 1 to 10) in separating and recovering each of the five parts of the mixture?

Salt: \_\_\_\_\_\_\_\_\_ Black pepper: \_\_\_\_\_\_\_\_\_ Sand: \_\_\_\_\_\_\_\_\_ Iron filings: \_\_\_\_\_\_\_\_\_ Pebbles: \_\_\_\_\_\_\_\_\_

1. Name 2 materials or tools that weren’t available that would have made your separation easier.
2. If you were able to do that lab over again, what specific things would you do differently?